

## WHAT IS CLAIMED IS:

1. A dielectric loaded antenna apparatus comprising:  
a column-shaped loaded dielectric which is loaded on an end  
portion of a feeding line of the dielectric loaded antenna apparatus,  
5 said loaded dielectric having an inclined radiation surface which is  
inclined from a surface perpendicular to an axial direction of said  
loaded dielectric.
2. The dielectric loaded antenna apparatus as claimed in claim  
1,  
10 wherein a cross section of said loaded dielectric perpendicular to  
the axial direction of said loaded dielectric has a shape of one of circle,  
ellipse and polygon.
3. The dielectric loaded antenna apparatus as claimed in claim  
1,  
15 wherein said feeding line is a waveguide, and  
wherein said waveguide includes:  
a radiation waveguide having an axis parallel to the axial  
direction of said loaded dielectric and including an opening for feeding  
an electromagnetic wave to said loaded dielectric; and  
20 a feeding waveguide for feeding the electromagnetic wave to said  
radiation waveguide.
4. The dielectric loaded antenna apparatus as claimed in claim  
3,  
wherein a dielectric is filled into an interior of said waveguide.
- 25 5. The dielectric loaded antenna apparatus as claimed in claim  
3,

wherein said loaded dielectric is arranged so that a central axis of said loaded dielectric is shifted from a central axis of said radiation waveguide.

6. The dielectric loaded antenna apparatus as claimed in claim  
5 3,

wherein said loaded dielectric is arranged so that a central axis of said loaded dielectric is shifted from a central axis of said radiation waveguide toward one of a polarization direction of the electromagnetic wave and a direction perpendicular to the polarization direction thereof.

10 7. The dielectric loaded antenna apparatus as claimed in claim  
3,

wherein said feeding waveguide is arranged so that a central axis of said feeding waveguide in the axial direction is shifted from a center of said radiation waveguide.

15 8. The dielectric loaded antenna apparatus as claimed in claim  
1,

wherein said feeding line is a microstrip line formed on a dielectric substrate, and

20 wherein a feeding patch conductor which feeds an  
electromagnetic wave to said loaded dielectric is provided on an end portion of said microstrip line.

9. The dielectric loaded antenna apparatus as claimed in claim  
8,

25 wherein said loaded dielectric is arranged so that a central axis  
of said loaded dielectric is shifted from a center of said feeding patch conductor.

10. The dielectric loaded antenna apparatus as claimed in claim 8,

wherein said loaded dielectric is arranged so that the central axis of said loaded dielectric is shifted from the center of said feeding patch conductor toward one of a polarization direction of the electromagnetic wave and a direction perpendicular direction to the polarization direction thereof.

11. The dielectric loaded antenna apparatus as claimed in claim 8,

wherein said microstrip line is arranged so that a central axis of said microstrip line is shifted from the center of said feeding patch conductor.

12. The dielectric loaded antenna apparatus as claimed in claim 1, further comprising a radome which covers said dielectric loaded antenna apparatus,

wherein said radome and said loaded dielectric are formed integrally with each other.

13. The dielectric loaded antenna apparatus as claimed in claim 1,

wherein said feeding line includes a waveguide and a microstrip line, and

wherein said dielectric loaded antenna apparatus further comprises a converter which is inserted between said waveguide and said microstrip line and which matches impedance between said waveguide to said microstrip line.

14. The dielectric loaded antenna apparatus as claimed in

claim 1,

wherein the inclined surface of said loaded dielectric is one of a surface inclined from an electric field plane of a radiated electromagnetic wave and a surface inclined from a magnetic field plane of the radiated electromagnetic wave.

15. The dielectric loaded antenna apparatus as claimed in claim 1, further comprising circularly polarized wave radiating device for radiating an electromagnetic wave radiated from said dielectric loaded antenna apparatus as a circularly polarized wave.

16. The dielectric loaded antenna apparatus as claimed in claim 15,

wherein said feeding line is a waveguide, and

wherein said waveguide includes:

a radiation waveguide having an axis parallel to the axial direction of said loaded dielectric and including an opening for feeding an electromagnetic wave to said loaded dielectric; and

a feeding waveguide for feeding the electromagnetic wave to said radiation waveguide, and

wherein said circularly polarized wave radiating device is constituted by forming the opening of said feeding waveguide in a hexagonal shape.

17. An array antenna apparatus comprising:

a plurality of dielectric loaded antenna apparatuses which are arranged to be apart from each other by a predetermined distance, each of said dielectric loaded antenna apparatuses including a column-shaped loaded dielectric which is loaded on an end portion of a

feeding line of the dielectric loaded antenna apparatus, said loaded dielectric having an inclined radiation surface which is inclined from a surface perpendicular to an axial direction of said loaded dielectric.

18. The array antenna apparatus as claimed in claim 17,  
5 wherein respective inclined surfaces of said loaded dielectrics of said dielectric loaded antenna apparatuses are inclined at a predetermined inclination angle in a predetermined direction so as to attain a predetermined directivity pattern of said array antenna apparatus.

10 19. The array antenna apparatus as claimed in claim 17, further comprising a switching device for selectively switching said loaded dielectrics to connect the selected loaded dielectric to the feeding line.

20. The array antenna apparatus as claimed in claim 17,  
15 wherein arrangement of said respective loaded dielectrics is changed according to an installation position of said array antenna apparatus.

21. The array antenna apparatus as claimed in claim 17,  
wherein a part of each of said loaded dielectrics is eliminated  
20 according to an installation position of said array antenna apparatus.

22. The array antenna apparatus as claimed in claim 17,  
wherein said dielectric loaded antenna apparatuses are arranged  
so that linear polarized waves of the electromagnetic waves radiated  
from each pair of dielectric loaded antenna apparatuses arranged to be  
25 adjacent to each other among said dielectric loaded antenna apparatuses are perpendicular to each other.

23. A radio communication apparatus comprising:

a dielectric loaded antenna apparatus arranged on a substrate,  
said dielectric loaded antenna apparatus including a column-shaped  
loaded dielectric which is loaded on an end portion of a feeding line of  
5 the dielectric loaded antenna apparatus, said loaded dielectric having  
an inclined radiation surface which is inclined from a surface  
perpendicular to an axial direction of said loaded dielectric; and

a radio transceiver circuit provided either one of on a surface of  
said substrate and in said substrate, said radio transceiver circuit  
10 being connected with said dielectric loaded antenna apparatus.

24. The radio communication apparatus as claimed in claim 23,  
further comprising a modulator and demodulator circuit provided on  
the surface of said substrate or in said substrate, said modulator and  
demodulator circuit being connected with said radio transceiver circuit.

15 25. A radio communication apparatus comprising:

an array antenna apparatus arranged on a substrate, said array  
antenna apparatus including a plurality of dielectric loaded antenna  
apparatuses which are arranged to be apart from each other by a  
predetermined distance, each of said dielectric loaded antenna  
20 apparatuses including a column-shaped loaded dielectric which is  
loaded on an end portion of a feeding line of the dielectric loaded  
antenna apparatus, said loaded dielectric having an inclined radiation  
surface which is inclined from a surface perpendicular to an axial  
direction of said loaded dielectric; and

25 a radio transceiver circuit provided either one of on a surface of  
said substrate and in said substrate, said radio transceiver circuit

being connected with said array antenna apparatus.

26. The radio communication apparatus as claimed in claim 25, further comprising a modulator and demodulator circuit provided either one of on the surface of said substrate and in said substrate, said
- 5 modulator and demodulator circuit being connected with said radio transceiver circuit.